

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Steven D. Nelson et al.

Confirmation No. 9079

Application No.: 09/656,325

Art Unit: 3641

Filed: September 6, 2000

Examiner: Troy Chambers

For: NETWORKED ELECTRONIC ORDNANCE
SYSTEM

INVENTOR'S DECLARATION UNDER 37 C.F.R. § 1.132

I Steven D. Nelson, declare as follows:

1. I am a co-inventor named in the above-identified patent application. I have carefully considered the Office Action dated February 27, 2007 (the "Office Action").

2. In 1981, I received a Bachelor's degree in Mechanical Engineering from the University of Southern California. Since that time, I have been employed in the aerospace industry and have worked at TRW, Special Devices Inc., and Pacific Scientific Energetic Materials Company. I am very familiar with the technology associated with rocket motors, pyrotechnics, and electronics used for operating ordnance systems. Since 1999, I have been in charge of product development, first at Special Devices Inc. and then at Pacific Scientific, in the aerospace field.

3. I understand that the Office Action objects to the specification of my patent application as failing to enable one having ordinary skill in the art to make or use the disclosed

invention because it allegedly "does not make clear the two conditions known as the analog condition and the firing condition." Additionally, the Office Action rejects claims 66, 67, and 90-100 as failing to comply with the enablement requirement. I disagree with this objection and rejection, and respectfully request reconsideration in light of the remarks provided herein.

4. As acknowledged in the Office Action, page 19 (ll. 5-10) of the specification clearly provides that:

The analog condition of the cable network 204 is preferably a characteristic of the electrical power transmitted across that cable network 204. By way of example and not limitation, the analog condition of the cable network 204 may be voltage level on the cable network 204, modulation depth, or frequency.

5. Page 19 (ll. 1-5) of the specification also provides that this condition can be altered by the bus controller 206 or by other devices electrically connected to the pyrotechnic system 200. For example, the analog condition can be altered by altering the voltage level of signals transmitted along the bus.

6. Prior to the claimed invention, it was known that the analog condition of a bus could be altered. For example, Boucher discloses a system in which the arming signal is transmitted at a higher voltage than communication signals. Therefore, the bus is in a different analog condition when a communication signal is transmitted as compared to the analog condition when an arm signal is transmitted.

7. More particularly, Boucher's communications signals are at a voltage that is lower than the no-fire threshold of the initiators. As Boucher describes, "in this way, test and programming signals that are not intended themselves to arm and/or initiate the initiator are carried

out at a level that is insufficient to arm and/or initiate the initiators even if the communication signals are somehow misinterpreted." (Boucher, 11: 1-5.)

8. Unfortunately, such an arrangement does not provide adequate safety and provides a suboptimal result. In Boucher, a communications signal is transmitted at a voltage that by itself is too low to sufficiently charge a firing capacitor. But, if the firing capacitor is already nearly charged, the low voltage communication signal could cause the pyrotechnic device to accidentally arm or fire.

9. The claimed invention solves this problem by adding an additional requirement beyond the known use of an arming signal and a firing signal. As described in the specification, "in a preferred embodiment, for an armed pyrotechnic device to fire, it must receive a digital firing command and sense proper analog conditions on the cable network 204" so that "both digital and analog fire control conditions must be met before the pyrotechnic device can be fired." (Page 18, ll. 18-21.)

10. This is accomplished by configuring the pyrotechnic device so that it can only fire if both (1) a digital firing signal is recognized by the logic device and (2) the logic device determines that the bus interface senses the analog condition corresponding to the firing command. (Page 20, ll. 10-11.)

11. The claimed invention provides a significant improvement over conventional systems because it utilizes both the logic device and the bus interface to ensure that it is intended for the pyrotechnic device to initiate. The logic device decodes a digital arming command and a digital

firing command. If the bus interface senses that the analog condition is altered, then the logic device closes a circuit between the energy reserve capacitor and the initiator. Without all of these measures – (i) the digital arming command, (ii) the digital firing command, and (iii) determination that the analog condition corresponds to the firing command – the pyrotechnic device does not fire.

12. Apparently, the confusion seems to stem from the sentence that reads "[p]referably, the bus controller 206 alters the analog condition of the cable network 204 to a firing condition." (Page 19, ll. 2-3) The Office Action interprets this sentence to mean that the "analog condition" somehow disappears and morphs into a "firing condition." However, this is not how one of ordinary skill in the art at the time of the invention would have interpreted this. Taking the specification as a whole, one of ordinary skill in the art at the time of the invention would have understood this to disclose that the analog condition of the bus is altered *so as to place the bus into a condition required for firing*. In that regard, an analog condition is established that corresponds to the firing command, and the pyrotechnic device is configured so as to fire only upon receiving the firing command and sensing the analog condition corresponding to the firing command.

13. An electronics technician skilled in the art at the time of the invention would know how to change a voltage, modulation depth, or frequency of a network to alter an analog condition of the network. Additionally, the technician would know how to sense that an analog condition of the network has been altered. An aspect of the claimed invention is directed to utilizing this technology as a critical safety measure for determining whether a pyrotechnic device should respond to a firing command. Based on the disclosure in the specification, one of ordinary skill in the art at the time of the invention would have been enabled to make and/or use the invention.

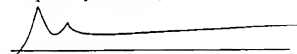
14. Claim 101 of the pending application is directed to a networked electronic ordnance system including a logic device having a unique identifier that stores activation energy upon receiving a digital arming command that includes its unique identifier, and (A) releases the stored activation energy into its initiator when a digital firing command is received that includes its unique identifier, and (B) discharges the stored activation energy when a digital disarming command is received that includes its unique identifier.

15. None of the references in the Office Action discloses a digital disarm command with a unique identifier. It is this component that enables the claimed system to selectively disarm certain networked pyrotechnic devices while leaving other networked pyrotechnic devices armed. This functionality provides significant advantages in aerospace applications, particularly for missiles.

16. The assignee of the pending patent application, PS/EMC West LLC, commercializes the claimed technology as the Smart Energetics Architecture (SEA™). The SEA technology has enjoyed tremendous success and acclaim directly as a result of improvements to the state of the art as discussed above.

Date: 8/27/07

Respectfully submitted,



Steven D. Nelson
Inventor